
One hundred forty-four high-health, high-lean growth barrows (Newsham) were used to determine the dietary lysine requirement to maintain growth performance from 18 to 34 kg. The experiment was designed in a randomized complete block, with blocks established on initial BW. Pigs were segregated early-weaned at 7 of age and fed high nutrient dense diets from weaning to 10 kg. At 11 kg, pigs were assigned to the growth rates 7.5, 8.5, 9.5, 10.5, and 11.5% with corresponding total lysine levels of 90, 102, 114, 126, and 138 g/kg. All diets were corn-soybean meal-based, and formulated on a digestible amino acid basis with all amino acids other than lysine formulated to meet or exceed current recommended estimates. Lysine HC1 was added to 15% of the diet and soybean meal was adjusted to increase negative lysine concentrations. Pigs were housed in pens of four with six replicate pens per treatment. Pig weight and feed disappearance were collected on d 7, 14, and 21 of the experiment to calculate ADG, ADFI, and feed efficiency (G:F). Pigs were bled on d 7 to evaluate serum N (PUN) concentrations. From d 0 to 7 ADG and G:F improved (linear, P < 0.01) with increasing digestible lysine (See Table). Pigs fed the 12.5% lysine level had 29% higher ADG and G:F than pigs fed the lowest level of digestible lysine (which is close to the current Dietary 1988 estimates) Increasing digestible lysine improved ADG and G:F (quadratic, P < 0.01) from d 0 to 14 and for the overall trial (d 0 to 21) with a maximum observed for both response criteria at approximately 12.75 to 13.25% total lysine (1.05 to 1.15% digestible lysine). However, ADPL was not influenced (P > 10) by dietary lysine at any point during the experiment. Increasing digestible lysine decreased then increased (quadratic, P < 0.01) PUN concentrations on d 7 based on the feed intake observed in this study. High-lean growth barrows that were fed the lowest digestible lysine (16 to 17 g/kg of total lysine) from 18 to 34 kg, to maximum ADG and G:F.

Diet Digestible Lysine, % Item 75 85 95 105 115 125 135 145 CV d 0 to 7 ADG kg* 60 62 69 72 73 75 87 87 7 57 61 65 70 69 71 88 4 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 G:F 57 61 65 70 69 71 88 4 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 d 0 to 14 ADG kg* 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 G:F 57 61 65 70 69 71 88 4 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 d 0 to 21 ADG kg* 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 G:F 57 61 65 70 69 71 88 4 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 G:F 57 61 65 70 69 71 88 4 67 69 74 79 80 78 4 6 65 64 61 65 63 3 8 69 73 74 78 79 74 4 4 69 73 74 78 79 74 4 4 3 Linear effect of dietary lysine (P < 0.01) 4 Quadratic effect of dietary lysine (P < 0.01) Key Words: Lysine; Pig growth performance

017 Impact of immune system activation on lysine and sulphur amino acid needs of 6 to 16 kg pigs. N. H. Williams*, T. S. Stahly, Iowa State University, Ames.

Pigs from a single genotype and source of origin were reared via a medicated-early-weaning or conventional-weaning scheme to evaluate the impact of a low and high level of immune system (IS) activation, respectively, on dietary lysine (L) and sulphur amino acid (SAA) needs of pigs. At 26 of age (6.1 to 11.6 kg), pigs were placed on a corn-soybean meal-based diet fortified with 1.4% crystalline lysine amino acids (essential and nonessential) to provide a minimum of 100% of the ideal ratios of digestible amino acids relative to L. Within each IS group, five intramune barrows in each of 12 litter were randomly allotted to the basal diet limiting in digestible L (60, 60, 10, 1.2, 1.2, 4.5%) or IS (55, 45, 57, 69, 89, 99, 69, 89, 69, 89, 89). The dietary L and SAA levels were achieved by substituting crystalline L-lysine or L-1- methionine for corn starch in the basal diet (1.4% digestible L; 82% digestible SAA). Pigs were penned individually in facilities maintained at 27°C and were offered ad libitum access to both feed and water. Data were analyzed as a split-split-plot design with IS level representing the whole plot, limiting amino acid representing the subplot, and level of limiting amino acid level representing the sub-subplot. Low IS pigs consumed more feed (DF) and gained weight faster (DF) and more efficiently (G:F) than high IS pigs (P < 0.10). A higher dietary level of L was required (P < 0.01) to optimize DG and G:F in the low versus high IS groups, however, the level of SAA relative to L tended to optimize DG and G:F was lower in the low (57/11 = 0.48) versus the high IS group (57/11 = 0.57). Based on these data, minimizing the pig’s level of IS activation enhances body growth rate, increases dietary L needs and alters the ‘ideal’ ratio of SAA relative to lysine.

IS Digestible Lysine, % Digestible SAA, % Item Level 60 80 10 1.2 1.4 33 45 57 69 82 DF, g/d Low 645 662 707 717 710 704 728 715 716 706 High 562 614 656 640 610 605 634 630 620 618 DG, g/d Low 292 334 425 475 435 358 399 432 442 431 High 235 316 355 324 309 308 339 357 323 305 G F Low 477 503 602 662 612 508 548 607 617 610 High 415 518 541 506 506 509 534 566 521 493

Key Words: Pigs, Immune system, Amino acids


Weaning places sufficient stress on the pig to predispose it to disease caused by colonization of pathogenic bacterium in the large intestine. FOS has been found to stimulate growth of indigenous microflora to prevent enteric colonization by pathogenic microorganisms. An experiment was conducted to evaluate the effectiveness of FOS for protection of neonatal pigs from infectious challenge with Escherichia Coli K88 (E. coli). Sixteen pigs(7d,3Kq b.w.) were removed from sows not vaccinated against E. coli and adapted to a non-medicated milk replacer diet(approximately 75ml per feeding/3 feedings/day) for 6 days. Eight pigs received milk replacer only and 8 received milk replacer plus 1g FOS per feeding. On day 7 pigs were challenged with oral administration of E. Coli (5ml X 10^8). Pigs were monitored for visible symptoms and fecal samples analyzed for E. Coli, Clustriadium, Bifidobacteria and total anaerobic flora. Within 36 hours 6 of 8 pigs in the control group developed symptoms of anaemia, pyrexia, dehydration, and diarrhea. One FOS pig developed diarrhea for 12 hours with remaining. FOS pigs showing no visible symptoms. Three pigs in the control group were euthanized resulting in a survival rate of 62.5%, compared to a survival rate of 100% in FOS pigs. Bacterial counts were analyzed on day 0, 2, 4, and 10 with results indicating a shift in microbial population . E. Coli were decreased(P<0.3)in FOS pigs at 9.4 X 10^6 compared to control pigs having a count of 6.4 X 10^7. Bifidobacteria were increased(P<0.01) in FOS pigs at 1.8 X 10^10 compared to 2.9 X 10^9 in control pigs. Clustriadium population changes were not different between groups. These results demonstrate that FOS can increase Bifidobacteria organisms in the large intestine of the pig which provides protection from infectious E. Coli.

Key Words: E. Coli, pig fructoooligosaccharide.